Claims

[1] A chemical-mechanical polishing slurry for shallow trench isolation comprising:

an aqueous abrasive solution, which is a mixture of deionized water, polishing particles, and a polishing particle dispersant; and

an aqueous additive solution for increasing the removal selectivity, characterized by that 100 parts by weight of said aqueous abrasive solution is mixed with 50 to 300 parts by weight of said aqueous additive solution.

[2] The chemical-mechanical polishing slurry for shallow trench isolation of claim 1, characterized by that said aqueous abrasive solution is comprised of said deionized water, 0.01 to 30 weight % of said polishing particles, and 0.1 to 10 weight % of a surfactant.

[3] The chemical-mechanical polishing slurry for shallow trench isolation of claim 2, characterized by that said aqueous additive solution is comprised of said deionized water, 0.001 to 5 weight % of a poly(meth)acrylic acid polymer, 0.001 to 4 weight % of a nitrogen-containing organic cyclic compound, and 0.001 to 3 weight % of an amine-group compound.

[4] The chemical-mechanical polishing slurry for shallow trench isolation of claim 3, characterized by that said polishing particles are one or more compounds selected from the group consisting of ceria, alumina, silica, and titania.

[5] The chemical-mechanical polishing slurry for shallow trench isolation of claim 4, characterized by that said polishing particles have a size of 0.002 to 10 micrometers.

[6] The chemical-mechanical polishing slurry for shallow trench isolation of claim 3, characterized by that said surfactant is one or more compounds selected from the group consisting of a polyacrylic acid ammonium salt, polymethacrylic acid ammonium salt, polyacrylic acid amine salt, polymethacrylic acid amine salt, poly(ethylene-co-acrylic acid) ammonium salt, poly(ethylene-co-acrylic acid) amine salt, poly(ethylene-co-methacrylic acid) ammonium salt, and poly(ethylene-co-methacrylic acid) amine salt.

[7] The chemical-mechanical polishing slurry for shallow trench isolation of claim 6, characterized by that the molecular weight of said surfactant is 1,000 to 1,250,000.

[8] The chemical-mechanical polishing slurry for shallow trench isolation of claim 3, characterized by that said poly(meth)acrylic acid polymer is one or more compounds selected from the group consisting of poly(acrylic acid), poly(methacrylic acid), poly(ethylene-co-acrylic acid), and

poly(ethylene-co-methacrylic acid).

[9] The chemical-mechanical polishing slurry for shallow trench isolation of claim 3, characterized by that said nitrogen-containing organic cyclic compound is one or more compounds selected from the group consisting of 1,3,5-triazine, 1,3,5-triazine-2,4,6-triol(cyanuric acid), 1,3,5-triazine-2,4,6-trichloride(cyanuric chloride), 1,3,5-triazine-2,4,6-trithiol(trithiocyanuric acid), 1,3,5-triazine-2,4,6-trithiol sodium salt, 1,3,5-triazine-2,4,7-trithiol trisodium salt nonahydrate, 3,5,7-triamino-s-triazolo[4,3-a]-s-triazine, 1,3,5-triacryloylhexahydro-1,3,5-triazine, 2,4,6-triaryloxy-1,3,5-triazine, triallyl-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione, 5-azacytidine, 5-azacytosine, 4-amino-1-β-D-arabinofuracyl-1,3,5-triazine-2(1H)-one, cyanuric fluoride, 2-chloro-4,6-dimethoxy-1,3,5-triazine, 2,4,6-triallyloxy-1,3,5-triazime, 2,4,6-triphenyl -1,3,5-triazine, 2-chloro-4,6-diamino-1,3,5-triazine, melamine, 2,4,6-tri(2-pyridyl)-1,3,5-triazine, 2,4,6-tris(1'-aziridinyl)-1,3,5-triazine, 1,2,4-triazine-3,5(2H,4H)-dion(6-azurasyl), 6-aza-2-thymine, 6-aza-2-thiothymine, 6-aza-2-thiouridine, 6-azaurasyl, 3-amino-5,6-dimethyl-1,2,4-triazine, 3-(2-pyridyl)-5,6-diphenyl-1,2,4-triazine, 3-(2-pyridyl)-5,6-bis(5-sulfo-2-furyl)-1,2,4-triazine disodium salt trihydrate, 3-(2-pyridyl)-5,6-diphenyl-1,2,4-triazine p,p'-disulfonic acid monosodium hydrate, and 5,6-di-2-furyl-3-(2-pyridyl)-1,2,4,-triazine.

[10] The chemical-mechanical polishing slurry for shallow trench isolation of claim 3, characterized by that said amine-group compound is one or more compounds selected from the group consisting of tetramethylammonium hydroxide, tetramethylammonium hydroxide pentahydrate, tetramethyl ammonium fluoride, tetramethylammonium fluoride tetrahydrate, tetramethylammonium chloride, tetramethylammonium bromide, tetramethylammonium iodide, tetramethylammonium nitrate, tetramethyl ammonium sulfate hydrate, tetramethylammonium acetate, tetramethylammonium carbonate, tetramethylammonium formate, tetramethylammonium silicate, tetramethylammonium tetrafluoroborate, tetramethylammonium cyoacetate, tetramethylammonium triacetoxyborohydrate, tetramethylammonium borohydride, tetramethylammonium (1-hydroxyethylidine) pentacarbonyl chromium, tetramethylammonium hexafluorophosphate, tetramethylammonium hydrogen phythalate, and tetramethylammonium hydrogen sulfate.

[11] The chemical-mechanical polishing slurry for shallow trench isolation of any of claims 1 through 10, characterized by that up to 500 parts by weight of

said deionized water is added with respect to the amount of said aqueous abrasive solution.

[12] The chemical-mechanical polishing slurry for shallow trench isolation of claims 1 through 10, characterized by that the pH of said chemical-mechanical polishing slurry is adjusted to be within the range of 6 to 8 by using one or more compounds selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, potassium hydroxide, and ammonia.